

Overview

Importance of Drug-Resistant Organisms (DRO) and Antimicrobial Resistance:

- Immediate cost increase
 - Inpatient care requirements
 - Protracted duration of admission
 - Costly alternative antibiotics
- Increased morbidity and mortality
- Lost productivity of staff and infected patients
- Potential of untreatable infections

MRSA

- Humans are natural reservoirs of *Staphylococcus aureus*.
- Thirty percent to 50% (30%-50%) of healthy adults are colonized, 10%-20% are persistently colonized with MRSA.
- Prevalence of community-acquired and nosocomial *Staphylococcus aureus* infections has increased steadily.
- Persons colonized with *Staphylococcus aureus* are at higher risk of developing active infection.
- Nosocomial infections have been linked with exposure to transiently-colonized hands of health-care workers.

Risk Factors Associated with MRSA

- Diabetes mellitus
- IV-drug use
- Hemodialysis
- Major surgical procedures
- Immunocompromised conditions
- History of long-term or frequent antibiotic use
- Invasive lines or tube (IV, urinary catheters, feeding tubes)
- Increased age (elderly)
- History of multiple hospitalizations or procedures
- Infections/colonization at other sites
- Morbid obesity
- Orthopedic implant surgery
- Long-term inpatient stay

VRE

- Enterococcus is generally a relatively harmless, avirulent flora with little infection potential.
- Enterococcus is normally commensal flora of the GI tract in 95% of healthy persons, as well as non-pathogenic flora in the vagina, oral cavity, perineal area, hepatobiliary tract and upper respiratory tract.
- Open wounds and pressure sores may act as reservoirs for Enterococci.
- Enterococci may survive on environmental surfaces for extended periods (weeks to months).

Risk Factors Associated with VRE

- Previous vancomycin use and/or overuse of oral vancomycin
- Multiantimicrobial therapy
 - Extended spectrum cephalosporins (ceftriaxone, cefotaxime, ceftazidime)
 - Possible anti-anaerobes (metronidazole, clindamycin, imipenem)
- High-risk patients or patients with the following conditions
 - Increased age (elderly)
 - Critically-ill patients
 - Hematologic malignancies
 - Neutropenia
 - Cirrhosis
 - Recent intra-abdominal surgery or cardio-thoracic surgery
 - Hemo/peritoneal dialysis
 - Prior nosocomial infection
 - Pressure sores
 - ICU, oncology or transplant wards
- Indwelling urinary or central venous catheter
- Prolonged hospital stay

Colonization Pressure

- Once infected, individuals can remain colonized for prolonged periods of time.
- These individuals are reservoirs for increased transmission to others.

Incidence:

- NNIS (National Nosocomial Infection Surveillance – CDC)
- Antimicrobial resistance a global and local problem
 - MRSA
 - Significant increase in mid 1980s in US
 - Resistance (MRSA) – 2.4% to 29% (1975-1991)
 - 50%-54% in high-risk areas such as ICUs (1999)
 - Endemic in nursing homes, IV-drug abusers, hemodialysis
 - VRE
 - Development of resistance to vancomycin first reported in 1986 (France/England)
 - Resistance (VRE) – 0.3% to 7.9% (1989-1993)
 - 0.4% - 13.6% in high-risk areas (ICUs)
 - VRE – 25% of all enterococcal isolates in ICUs
 - ~90% of *Enterococcus faecium* strains are resistant to ampicillin and aminoglycosides
 - Concerns with VRE
 - VISA, VRSA, VISE, VRSE (transfer of plasmids)
 - Lack of available antimicrobial therapy for VRE
 - Commonly colonizes patients and environment
- North Dakota
 - MRSA
 - Two North Dakota children died in 1983 and 1998 due to MRSA.
 - 2002-->50% of all staphylococcal isolates were MRSA at some North Dakota hospitals.
 - 2003--1,329 cases were reported to the North Dakota Department of Health.

- 979 classified as noninvasive (Rate = 152.4/100,000)
 - 350 classified as invasive (Rate = 54.5/100,000)
- Greatest impact on elderly
 - 39% of noninvasive isolates \geq 65 years of age
 - 75%+ of invasive isolates \geq 65 years of age
- VRE
 - 2003--20 infections reported
 - 16 (80%) \geq 65 years of age

Coagulase Negative Staphylococcus

- Includes species of *Staphylococcus epidermidis* [\sim 70% are *methicillin-resistant (MRSE)*].
- CDC standard precautions are necessary for patient management.
- *Vancomycin-intermediate resistant (VISE)* and *Vancomycin-resistant Staphylococcus epidermidis (VRSE)* would require expanded control measures as recommended in this document.